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Plant Production Cost-accounting/ Management System

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Abstract. A microcomputer program has been developed to keep records on energy, labor costs, product pricing, and revenue predictions for greenhouse and nursery production. The program manages plant production data, potentially enabling the grower to improve production and profits. The grower can use the program to determine how much it costs to produce individual plants, to ascertain labor costs and where to reallocate employees. Advertising and other indirect costs can be included to determine cost of production on a per-plant or per-square-foot basis.

Effective monitoring and reporting of production costs associated with greenhouse and nursery businesses are necessary to identify profitable growing conditions. Several cost studies for producing ornamental plants have been published (Badenhop and Phillips, 1983; Badenhop et al., 1985; Taylor et al., 1983) and can be used as guidelines for estimating production costs. These studies are limited to specific plants, size of operation, and cultural practices. Such information may not apply to a specific operation (Tripepi and Kuchar, 1983). Individual businesses need to monitor production operations to ensure relevant and accurate cost data.

PPCAM. We present a microcomputer software system called Plant Production Cost-Accounting/ Management (PPCAM) to manage plant production data and enable the user to optimize production and profits. PPCAM generates labor, material, energy, and indirect cost information from daily data input. Reports, summaries, and graphics of various variables involved in production can be generated, stored, and retrieved at any time, allowing the grower to compare past results with current data. The program handles a maximum of 999 crops and 99 employees simultaneously. Options to archive, delete, and recall data pertaining to a particular crop are available.

PPCAM is a user-friendly, menu-driven

system consisting of several options (Fig. 1). The user first selects the SETUP option to enter labor, greenhouse production area, energy, and product data. The primary purpose of SETUP is to facilitate one-time data entry. SETUP is used every time a new crop is started or a new greenhouse is put on line. PPCAM also uses SETUP to give the user flexibility in customizing the types of labor operations and materials relevant to the operation.

Once basic data have been entered, the user selects MATERIAL/PRICE LISTING. All materials are entered in this option. The program facilitates entry of units and corresponding prices. PPCAM then calculates and stores the cost per unit.

NON-PRODUCTIVE (INDIRECT) COST ANALYSIS is used to enter information such as asset type, life expectancy, and terms of financing. The interest on borrowed money and corresponding depreciation is automatically calculated by PPCAM. All depreciation is handled using the straight line method.

ENERGY COST ANALYSIS is used to generate the cost of energy allocated to a particular crop. In SETUP, the user already answered a series of prompts on type of energy sources for each greenhouse and the unit energy costs. The ENERGY COST

ANALYSIS section provides a means of entering and observing the total energy costs associated with the operation of a particular greenhouse between two dates. It is being expanded to provide a method of allocating energy costs to individual greenhouses when only one energy meter is used for the entire greenhouse range. This will allow the user to estimate the energy consumption of each greenhouse relative to the others and assign a percentage of the meter reading to each house.

Labor data are entered in LABOR TIME SHEET/MONTHS according to date, crop, and employee. The number of hours spent on each operation is entered, along with any materials the employee uses on the crop. The labor/material data must be collected by the employees during actual production. Commercially available electronic pocket diaries can be used to record the necessary data. Some of these pocket diaries come equipped with an RS232-type outlet for directly connecting the device to the personal computer for downloading the data to the computer (Ritter, 1988). If the data cannot be recorded electronically, other data collection options include audio tape recorders or written time cards. PPCAM has been designed in such a way that unskilled labor can manually enter labor data into the program.

All previously entered data are updated by PPCAM before a written report is generated. Two options (BATCH UPDATE ROUTINE and ONE SPECIFIC PRODUCT UPDATE) are used for this purpose. The BATCH section permits the user to update all current crop data in one sitting. Options in the BATCH section allow the user to print the results. This option is necessary to track and update many crops simultaneously. The ONE SPECIFIC PRODUCT UPDATE section is used to update one crop at a time. This option also facilitates the entry of the ending date for a specific crop.

The remaining sections found in Fig. 1 of the Main Menu allow the user to archive and store the results of the crop monitoring. Once archived, the historical data can be recalled for comparison to current data. Also, graphics can be regenerated on the historical data.

Example of use. PPCAM includes an

PLANT PRODUCTION COST-ACCOUNTING/MANAGEMENT SYSTEM

Enter the first letter of the desired option!

- C Customize Setup Operations Template
- M Material/Price Listing
- N Non-Productive (Indirect) Cost Analysis
- E Energy Cost Analysis
- L Labor Time Sheets/Month (Input)
- U Update (Batch) Routine
- O One Specific Product Update/Ending Routine.
- S Summaries (Output)
- A Archiving/Deleting Files
- R Recalling Archived Files from Disk Storage
- Q QUIT
- D DEMONSTRATION

Fig. 1 Main menu for PPCAM.

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PRODUCT SUMMARY:

Product Name	Starting Date			Finishing Date			Last Update		
	Year	Month	Day	Year	Month	Day	Year	Month	Day
Poinsettias V-14 Gutbier 5"	87	9	5	87	12	9	87	12	9

Crop Code	Area Used (Ft ²)	Total Prod. Area	Quantity Plants	Loss (%)	Unused Area (Ft ²)	Unused Area Charged (%)	Growing Address House	Tag
1	445	2,670	445	15	908	0.00	1	1

COSTS PER PLANT

Labor		Materials	Energy		Nonproductive
(Prod)	Nonprod)		Natural Gas	Electricity	
0.32	0.20	0.88	1.79	0.12	0.51

Total Cost Per Plant	Wholesale Profit Margin	Wholesale Price	Retail Profit Margin	Retail Price
3.82	1.30	4.96	1.90	9.43

ECONOMIC ANALYSIS ON CROP

Total Cost	Total Wholesale Profit	Total Retail Profit	Total Profit
1,443.64	433.09	1,689.06	2,122.16
Total Cost Per Ft ²	Total Wholesale Profit Per Ft ²	Total Retail Profit Per Ft ²	Total Profit Per Ft ²
3.24	0.97	3.80	4.77

Fig. 2. Product summary output example.

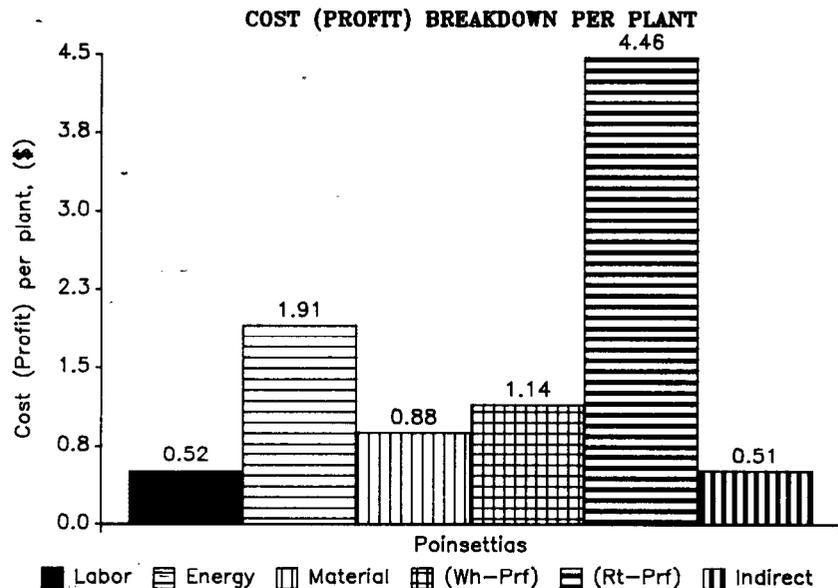


Fig. 3. Graph of cost (profit) breakdown for poinsettia crop.

output section that produces Product (price/profit margin determination) Summaries, Production Labor/Material and Crop Spacing Reports, Labor Summaries, Energy Summaries, and Nonproduction (indirect Cost Reports. Figure 2 shows a Product Summary Report from actual data collected

by the Dept. of Horticulture at the Univ. of Nebraska on a crop of poinsettias. Flexibility in the program allows the user to adjust the percentage loss and profit margin and/or price. If the user sets a profit margin for the crop, PPCAM generates the necessary price and vice versa. Graphics

of the data can be automatically generated using bar charts or pie charts to show the quantity of various costs and profits of production relative to one another (Fig. 3).

The Labor Summaries report all labor time and money used to produce a particular crop. The summaries can be generated on a particular employee or as the sum of all employees who worked on a particular crop. These reports can be used for reallocating labor and for improving the efficiency of the plant production process.

PPCAM has been beta-tested at a nursery, a commercial greenhouse range, and a university greenhouse for flexibility, ease of customization, and usefulness to the business. Although no written documentation on PPCAM was provided to the beta-testers, favorable performance was reported on the three test criteria. All beta-testers reported that by using the HELP explanations and tutorial features found in PPCAM, a minimum amount of time was needed to learn and execute PPCAM. However, all of the beta-testers expressed a desire for attaining written documentation on the system. We are writing a manual for PPCAM.

Hardware and software requirements. The PPCAM program was created using the SMARTWARE SYSTEM project-file programming language (Informix Inc., Software Inc., Lenexa, Kan.). The PPCAM program integrates the project-file language with several spreadsheet templates to produce its user-friendly environment. Hardware requirements include any microcomputer capable of operating the PC- or MS-DOS (Microsoft Corp., Seattle, Wash.) version 2.0 or higher. Although PPCAM will run on microcomputers using the 8088 processor, speed becomes the limiting factor. Processors that will run at 10 mHz or faster are recommended. Numerous graphics cards are supported by SMARTWARE and a minimum of 384 Kb of RAM is required to run the SMARTWARE software. The PPCAM program requires a hard disk (minimum of 10 megabytes) and 640 Kb of RAM on the motherboard.

Greenhouse and nursery businesses stand to gain valuable information on the amount of labor, energy, and materials needed to produce a crop through the use of PPCAM. Producers may use the program to track their production inputs, creating a base for future management comparisons. Growers may use PPCAM as a labor management tool, product price generator, and revenue predictor. PPCAM may also be used to determine the costs of production of new crops that might be used in a product mix.

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